

**SAMPLE PAPER, 2017-18**

**MATHEMATICS**

**CLASS - XI**

**SECTION: A**

- 1 Evaluate:  $i + i^2 + i^3 + i^4 + \dots + i^x$  where,  $\{x: x \text{ is number of primes less than } 73\}$
- 2 Find the ratio in which the line segment joining the points (4,8,10) and (6,10,-8) is divided by the YZ-plane.
- 3 If  $\lim_{x \rightarrow -a} \frac{x^9 + a^9}{x+a} = 9$ , find real values of 'a'.
- 4 Write the negation of the following statement and check whether the resulting statement is true:  
"There does not exist a quadrilateral which has all its sides equal"

**SECTION : B**

- 5 Prove that  $A-(B-C)=(A-B) \cup (A-C)$
- 6 Prove that :  $a \cos\left(\frac{B-C}{2}\right) = (b+c) \sin\frac{A}{2}$
- 7 Solve:  $\frac{x-2}{x+5} > 2$
- 8 How many numbers greater than a million can be formed with the digits 2,3,0,3,4,2,3 ?
- 9 If the first term of an AP is 2 and sum of first five terms is equal to one-fourth of the sum of the next five terms, find the sum of first 30 terms.
- 10 Evaluate:  $\frac{1}{2} + \frac{1}{3^2} + \frac{1}{2^3} + \frac{1}{3^4} + \frac{1}{2^5} + \frac{1}{3^6} \dots$  upto  $\infty$
- 11 Convert :  $-\sqrt{3}x + y + 18 = 0$  into normal form and find the length of the normal and angle which normal makes with X-axis.
- 12 A coin is tossed. If it shows a head, toss it again; but, if a tail comes up, throw a dice. Find the probability of getting exactly one head.

**SECTION : C**

- 13 Find the domain and range of the function:  $f(x) = \frac{1}{\sqrt{9-x^2}}$
- 14 Use PMI to show that:  $1+3+3^2+\dots+3^{n-1} = \frac{3^n-1}{2}$   
OR,  
Use PMI to show that  $3^{2n+2} - 8n - 9$  is divisible by 8.
- 15 Solve:  $2x^2 - (3+7i)x - (3-9i) = 0$  over C.
- 16 Solve:  $x - y \leq 1, x + 2y \leq 8, 2x + y \geq 2, x, y \geq 0$
- 17 Find the number of combinations and permutations of 4 letters taken from the word 'EXAMINATION'.
- 18 Find 'n' if the ratio of 7<sup>th</sup> term from the beginning to the 7<sup>th</sup> term from the end in  $\left(\sqrt[3]{2} + \frac{1}{\sqrt[3]{3}}\right)^n$  is  $\frac{1}{6}$ .

- 19 If first and nth terms of a GP are a and b respectively and P is the product of the first n terms, prove that:

$$p^2 = (ab)^n$$

OR,

Find the sum of the series:  $3.8+6.11+9.14+\dots$  upto n terms.

- 20 A circle has radius 3 units and its centre lies on the line  $y = x - 1$ . Find the equation of the circle, if it passes through the point (7,3)

- 21 Evaluate:  $\lim_{x \rightarrow \pi/3} \frac{\sqrt{1-\cos 6x}}{\sqrt{2}(\pi/3-x)}$

OR,

Find the derivative of  $f(x) = e^{2x}$  from the first principle.

- 22 If letters of the word ATTRACTION are written down at random, find the probability that:

- I) All the T's occur together  
 II) No two T's occur together.

- 23 Show that:

$$\sin \alpha + \sin \beta + \sin \gamma - \sin(\alpha + \beta + \gamma) = 4 \sin\left(\frac{\alpha+\beta}{2}\right) \cdot \sin\left(\frac{\beta+\gamma}{2}\right) \cdot \sin\left(\frac{\gamma+\alpha}{2}\right)$$

OR,

$$a(\cos C - \cos B) = 2(b - c) \cos^2 \frac{A}{2}$$

### SECTION::D

- 24 In a survey of 100 students, the number of students studying the various languages were found to be: English only 18, English but not Hindi 23, English and German 8, English 26, German 48, German and Hindi 8, no languages 24. Find the number of students who were studying:

- i) English and Hindi  
 ii) English, Hindi and German  
 iii) Hindi

- 25 Solve:  $4 \sin x \cdot \sin 2x \cdot \sin 4x = \sin 3x$

OR,  $\cos x \cdot \cos 2x \cdot \cos 3x = \frac{1}{4}$

- 26 Find the modulus, argument and conjugate of the following complex number. Also convert it into polar form:

$$\frac{i-1}{\cos \pi/3 + i \sin \pi/3}$$

- 27 Find the equation of a straight line on which the perpendicular from origin makes an angle 30 degree with positive X-axis and which form a triangle of area  $50\sqrt{3}$  with the coordinate axes. Also, find the intercepts made by these lines with coordinate axes.

OR,

Find the distance of the line  $4x-y=0$  from the point P(4,1) measured along the line making an angle of 135 degree with positive X-axis.

- 28 Find the equation of the parabola whose focus is (1,1) and the tangent at the vertex is  $x+y=1$

OR,

For the following curve, find lengths of the major and minor axes, coordinates of the foci, vertices, latus rectum and eccentricity:  $16x^2 + 25y^2 = 400$

- 29 Find the mean and variance of first n natural numbers.

OR,

Calculate the mean deviation about the median of the following data:

Wages per week (In Rs.)	10-20	20-30	30-40	40-50	50-60	60-70	70-80
No. of workers	4	6	10	20	10	6	4

\*\*\*